

In the United States Patent and Trademark Office

Appn. Number: _____

Appn. Filed: _____

Applicant(s): Johs et al

Appn. Title: Discrete Polarization Spectroscopic Ellipsometer
1324 System & Method of

Examiner/GAU: _____

Mailed: with Application

At: _____

Information Disclosure Statement

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

Attached is a completed Form PTO-1449 and copies of the pertinent parts of the references cited thereon.

Following are comments on these references pursuant to Rule 98:

IDENTIFIED PATENTS

Patents of which the Inventor is aware include those to:

Woollam et al, No. 5,373,359,
Johs et al. No. 5,666,201

and are disclosed for general information as they pertain to ellipsometer systems in cluding reflective means.

Patent 6,268,917 to Johs discloses a system for combining a plurality of polychromatic beams into a single beam which has a smoother intensity vs. wavelength plot.

Patent to Johs et al., No. 5,872,630 is disclosed as it describ s an ellipsometer system in which an analyzer and polarizer are maintained in a fixed in position during data acquisition, while a compensator is caused to continuously rotate.

Further Patents of which the Inventor is aware include:

Nos. 5,757,494 and 5,956,145 to Green et al., in which are taught a method for extending the range of Rotating Analyzer/Polarizer ellipsometer systems to allow measurement of DELTA'S near zero (0.0) and one-hundred-eighty (180) degrees, and the extension of modulator element ellipsometers to PSI'S of forty-five (45) degrees. Said Patents describes the presence of a variable,

transmissive, bi-refrangent component which is added, and the application thereof during data acquisition to enable the identified capability.

Patent to He et al., No. 5,963,327 is disclosed as it describes an ellipsometer system which enables providing a polarized beam of electromagnetic radiation at an oblique angle-of-incidence to a sample system in a small spot area.

Patent to Coates et al., No. 4,826,321 is disclosed as it describes applying a reflected monochromatic beam of plane polarized electromagnetic radiation at a Brewster angle of incidence to a sample substrate to determine the thickness of a thin film thereupon. This Patent also describes calibration utilizing two sample substrates, which have different depths of surface coating.

Patent to Dill et al. No. 4,053,232 is disclosed as it describes a rotating compensator ellipsometer.

Patent to Miller et al., No. 5,155,623 is disclosed as it describes a beam combiner.

Patent to Chen et al., No 5,581,350 is disclosed as it describes calibration of an ellipsometer via regression.

Russian Patent, No. SU 1518728 is disclosed but not believed to be particularly relevant, however.

Patent No. 5,329,357 to Bernoux et al. is also identified as it Claims use of fiber optics to carry electromagnetic radiation to and from an ellipsometer system which has at least one polarizer and analyzer which rotates during data acquisition.

Patent No. 4,053,232 to Dill et al. is disclosed for its discussion of a rotating compensator ellipsometer.

Patent No. 4,647,207 to Bjork et al. is disclosed for its discussion of reflecting means in ellipsometers.

No. 5,179,462 to Kageyama et al. is identified as it provides a sequence of three electromagnetic beam combining dichroic mirrors in an arrangement which produces an output beam of electromagnetic radiation that contains wavelengths from each of four sources of electromagnetic radiation.

Patents No. 4,982,206 to Kessler et al. describe electromagnetic beam combination systems in laser printer and laser beam scanning systems respectively.

Patent, No. 3,947,688 to Massey, describes a method of generating

tuneable coherent ultraviolet light, comprising use of an electromagnetic electromagnetic beam combining system.

IDENTIFIED SCIENTIFIC PAPERS

A paper by Johs, titled "Regression Calibration Method for Rotating Element Ellipsometers", Thin Solid Films, 234 (1993) is also disclosed as it describes a mathematical regression based approach to calibrating ellipsometer systems.

A paper by Smith, "An Automated Scanning Ellipsometer", Surface Science, Vol. 56, No. 1 (1976) is identified as it describes an ellipsometer which does not require moving (ie. rotating), elements during data collection.

Papers, by Azzam and Azzam et al. are also identified:

"Multichannel Polarization State Detectors For Time-Resolved Ellipsometry", Thin Solid Film, 234 (1993); and

"Spectrophotopolarimeter Based On Multiple Reflections In A Coated Dielectric Slab", Thin Solid Films 313 (1998); and

A review paper by Collins, titled "Automatic Rotating Element Ellipsometers: Calibration, Operation and Real-Time Applications", Rev. Sci. Instrum., 61(8) (1990), is identified for general information.

SINCERELY,

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